PENNSYLVANIA RAILROAD, HUNTER INTERLOCKING TOWER HAER No.NJ-103
At the east end of Bigelow Street at
Amtrak milepost 10.55,
Ponier Street Yards
Newark
New Jersey

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Northeast Region
Philadelphia Support Office
U.S. Custom House
200 Chestnut Street
Philadelphia, P.A. 19106

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HISTORIC AMERICAN ENGINEERING RECORD
PENNSYLVANIA RAILROAD, HUNTER INTERLOCKING TOWER
HAER NO. NJ -103

Location: At the east end of Bigelow Street at Amtrak milepost 10.55, Ponier Street Yards, Newark, Essex County, New Jersey

Date of Construction: ca. 1930

Designer/Constructor: In-house staff of the Pennsylvania Railroad

Present Owner: AMTRAK
National Railroad Passenger Corporation
30th Street Station
Philadelphia, PA 19104

Present Use: Interlocking tower

Significance: Hunter Interlocking Tower is a classic example of the architecturally unadorned and utilitarian twentieth century interlocking tower, significant as an increasingly endangered historic property type. Interlocking towers have played an important role in safe railroad operations. Once a vital part of railroad operations and a common sight along railroad rights-of-way, these small unobtrusive buildings are rapidly being replaced by remote control interlockings.

Project Information: Hunter Interlocking Tower will be demolished to construct the Hunter Connection, a rail link between AMTRAK's Northeast Corridor Line (NEC) and CONRAIL's Lehigh Valley Line (LVL). Hunter Connection will also be used by New Jersey Transit's (NJ TRANSIT) Raritan Valley Line (RVL). The Hunter Connection will eliminate a curved section of track which currently requires rail traffic through the interlocking to reduce speed from 70 mph to 15 mph. To mitigate the adverse effect of the demolition, the State Historic Preservation Office stipulated HAER documentation of Hunter Tower and an inventory of equipment in the tower to be offered to railroad museums and societies.

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DESCRIPTION

Hunter Tower, named after nearby Hunter Street, is located near the Poinier Street Yards, the City of Newark, County of Essex, New Jersey, at the connection between AMTRAK's Northeast Corridor Line and Conrail's Lehigh Line (formerly the Pennsylvania Railroad (PRR) Main Line and the Lehigh Valley Main Line). The railroad milepost location of the tower, originating from Jersey City, is 10.55. AMTRAK owns and operates the Tower which was constructed ca. 1930 by the PRR during an extensive electrification project on the Main Line.

Hunter Tower controls Hunter Interlocking, which is located at the connection between AMTRAK's Northeast Corridor (NEC) and Conrail's Lehigh Valley Line (LVL) and provides the NJ TRANSIT Raritan Valley Line (RVL) access to the NEC. The existing single connecting track extends west from Hunter to Conrail's NK Tower, a distance of approximately one mile, where it joins Conrail's LVL, which carries the Raritan Valley traffic to Aldene Interlocking and then onto the RVL Itself. On a daily basis, approximately 30 NJ TRANSIT eastbound and 30 NJ TRANSIT westbound passenger trains use Hunter Interlocking. About 20 Conrail freight trains per day pass through using the LVL.

The Tower, at the foot of Bigelow Street, is accessed (pedestrian and vehicular) through a gated entry on the south side of Poinier Street. The Tower is within six sets of track: four Northeast Corridor Line tracks on the east and two inactive freight sidings to the west. The surrounding neighborhood has commercial, industrial and railroad related uses. The riveted truss bridge of the Lehigh Valley Main Line is visible to the southwest and the McCarter Highway (Route 21) Viaduct is located to the northeast of the Tower. To the south is Route 22 and Interstate 78. Directly to the southeast is Newark International Airport. Because of its location behind a heavy industrial area and between rail sidings and active passenger lines, the tower is not readily visible from any public thoroughfare. Only a portion of the roof is visible from Frelinghuysen Avenue at Bigelow Street.

Hunter Tower is a two story brick structure atop a raised concrete block basement, exposed on the west by the slope of the site. The plan is rectangular, measuring 18 feet, 10 inches by 35 feet, 7 inches, with the broader east and west facades parallel to the tracks. The moderately pitched hipped roof has broad, projecting eaves with a flush-boarded soffit and is now covered with asphalt shingles.

The main entry is at the east side of the two-bay south facade, reached by concrete steps with a pipe railing. A shed-roofed overdoor with original wood brackets details the entrance. Steps at the north facade lead down to a basement entrance, now overgrown by shrubbery and weeds.

Hunter Tower is utilitarian in design, with a plain brick exterior accented by a watertable of a single rowlock course of brick, repeated in a belt course below the first floor and second floor windows. The east elevation has a shallow bay window on the upper level, providing clear views of the track. The narrow east and west facades have two one-over-one, double hung sash windows each at the second floor level; the rear, or west elevation, has three, irregularly spaced

double hung sash windows above the first floor belt course. A single double-hung sash window provides light to the basement on the exposed west facade.

The entire structure is painted a light yellow and is peeling at many locations exposing the red brick underneath. The bracketed overdoor is in fair condition, with some deterioration at the cornice. The original wood soffit has been patched in several locations with metal and some of the original wood sash have been replaced with aluminum storm windows.

The interior plan of the tower consists of a single room on each of the three floors. The basement contains an air compressor for pneumatic operation of the switches, electrical boxes, a furnace and the relay room. Spare parts and graphite for the switches (to help them slide easily) are also stored in the basement level. The first floor is used as a communications and signal office for the railroad maintenance men and a storage area for signal and switch relay equipment.

The primary interlocking function of Hunter Tower is on the second floor, where the tower operator is located, and consists of a large open room with a projecting bay window overlooking the railroad right-of-way. This section of the tower houses the operator portion of the interlocking machine, the dragging equipment detector box, a communications patch board, and the traffic control system boards. In addition to handling the signals and switch operations, the tower operator also controls the power board which regulates electricity to the catenary wires. Railroad safety and operating equipment is stored on the second floor and includes signal flags and lanterns, and flares. Hunter Tower also has a communication patch board, which is no longer in use.

The primary and largest piece of equipment in the tower is the interlocking machine, which was manufactured by the Union Switch Company in Baltimore in 1935. An interlocking plant consists of various levers operating a number of interconnected switches and signals so that only proper and non-conflicting routes can be set up. This interconnecting of devices used to operate switches or signals so that the movement of trains can occur in a predetermined sequence is called an "interlocking," and the assemblage of stands, levers, locking and connections is called an interlocking machine.

The Hunter Tower interlocking machine has 11 switch levers, 8 yellow signal levers and 6 red and yellow traffic levers, within a large steel enclosure measuring approximately ten feet wide, four feet high and five feet deep. The machine also has 5 slow release timers. These timers ensure the safe rerouting of switches or signals in the event that a train has been routed improperly or if the direction of a train needs to be changed. Each lever has a number which corresponds to either an interlocking signal, a switch or a traffic control lever. The interlocking machine also has removable metal blocking devices which are placed over switches to remind operators of unusual conditions affecting the movements of trains and to avoid inadvertent operation.

The traffic control system and power blocking device is a small steel box located on the operators desk, here with 22 toggle switches which indicate the location of a train as it

approaches the tower. Mounted on the wall near the operator's desk is a small wooden box with a glass door. This contains the dragging equipment detector, circa 1930, whose function is to indicate if a line or some other material is hanging from the train and dragging along the tracks. The power board, manufactured circa 1930 by General Electric, dispatches power to sections of the catenary. If men are working on the catenary, these levers are tagged to prevent activation of the overhead wires. Behind the interlocking machine is the communication patch board which, although no longer in use, once controlled all telephone lines. The patch board was replaced in the mid-1980's by pentaphones (speakerphones) and a fiberoptic system.

The second floor of the tower also contains employee lockers, an employee bulletin board with general notices and bulletin orders relating to rail operations. The tower operator keeps a "station record of train movements" (or "OS" - On Schedule) sheet. These sheets keep track of all movement of trains within an interlocking as well as train orders, weather conditions and other comments pertinent to the safe operation of the railroad.

SIGNIFICANCE OF HUNTER TOWER AND INTERLOCKING SYSTEMS

The site where Hunter Tower is located was formerly the Alpine Street Yards of the Lehigh Valley Railroad (LVR). In 1912, the LVR operated a large coal pockets building in the yard which extended three city blocks from Stanton Street to Earl Street and a stone freight station at the southwest corner of Pennsylvania Avenue and Poinier Street. Railroad sidings from the LVR extended into various neighboring industrial concerns such as the W. T. Crane Carriage Hardware Company, the M. W. Simonson Grains and the Vreeland Kearny Lumber Company. Directly to the east of the Alpine Street Yards of the LVR were the Broad Street Yards of the PRR.

By 1927, the area was known by its current name, the Poinier Street Yards. The PRR had expanded their operations in the yard, having constructed several new buildings along the right-of-way including a storage house, carpenter shop and machine shop. Hunter Tower is the only rail-related structure which remains intact from this period; the other rail structures in the Poinier Street Yards were demolished in the 1970s and 1980s.

Interlocking towers, like railroad stations, are building types which were developed as a result of the advent of the railroad. Unlike railroad stations, which have retained their function or can be recycled for a new use, interlocking towers are rapidly disappearing because their function has become largely obsolete. Currently, numerous interlocking towers remain intact throughout New Jersey. However, as the train dispatcher's role is increasingly computerized and centralized, interlocking towers, once an essential component of safe and efficient railroad operations, have become an endangered building type.

An interlocking tower, often simply called a switch tower, houses the machinery and the necessary appurtenances for the operation of the various switch and signal units of an interlocking plant. The lower story is used by the track maintainer for the storage of track equipment. The upper story is the tower operator's room. As a clear view of the tracks from the

tower is an important factor, the upper story is characterized by a window wall or a bay with single sash or double hung windows. The general rule was that towers should not be located closer than 8 feet from the nearest running rail. In the *Railway and Maintenance Cyclopedia,* published in 1926, the requirements for an interlocking station stated "that the building be at the best possible point giving due consideration to the proper handling of signals, view of the tracks and operation of the trains" and "that the building harmonizes with the surrounding railroad buildings."

Interlocking towers were typically constructed of wood, concrete, brick and/or stucco depending on the conditions of the site and the architectural style favored by the railroad company. Early towers were almost always constructed of wood and were often characterized by broad, bracketed eaves and Eastlake detail. In the chapter on Signal Towers in Walter Berg's *Buildings and Structures of American Railroads* published in 1893, a variety of signal towers are described and illustrated. Berg reported that the Philadelphia and Reading Railroad used a unique octagonal style tower of wood frame construction, ranging in height from 30 to 50 feet.

Another early tower described was a two-legged tower used by the PRR at Newark, New Jersey. This type of tower, used where ground space was limited, was constructed on two posts or legs. A tower of this type could have pre-dated the existing Hunter Tower. One-legged signal towers were also used in areas with an extreme lack of space--the operating level was reached by iron rungs attached to the support post and entered through a trap door in the floor.

Berg describes the Standard Signal Tower of the Pennsylvania Railroad as "a two story frame structure, the lower part being square, and the upper part octagonal in shape. A large part of the structure is usually framed and put together in the shop before being shipped to the site. Where an extensive switch system is required, another standard design is used, namely an oblong two story frame building."

When the towers housed more expensive equipment such as the heavy interlocking machines, fireproofing became important and the older wood towers, which had not already succumbed to fire, were often replaced by more durable brick or concrete towers. Most signal towers which remain today are constructed of brick with a concrete foundation and a hipped roof with composition shingles. For the most part, each railroad company had in-house engineers and architects who were responsible for the design of the majority of the railroad structures. Therefore, signal tower styles became representative of particular railroads as did the rail station designs. Some railroad companies offered more stylistic variation for these utilitarian buildings; the reinforced concrete signal towers of the New York, New Haven and Hartford Railroad designed in the Mission Revival style with Spanish Tile roofs and arched openings were novel enough to be an entry in a 1909 issue of *Engineering News Record.*

Although the Pennsylvania Railroad was one of the wealthiest railroads for most of its corporate history, it was frugal on building expenditures unless the location merited something other than the standard brick PRR design. At major cities, the PRR would hire outside architects to work with their Engineering Department in Philadelphia to design architecturally pleasing structures

which served as advertisements for the railroad, but for smaller stations and less prominent railroad structures such as signal towers, the PRR constructed durable, straightforward, railroad buildings with few architectural embellishments.

For the unobtrusive Hunter Interlocking, the PRR constructed the tower in railroad vernacular style. It is similar in form and materials to other Pennsylvania Railroad signal towers in New Jersey: a simple, two story hipped roof brick structure with a basement, concrete block foundation, unadorned facade except for belt courses at the first and second stories, the traditional projecting trackside bay with a band of windows, and a brick chimney on the rear elevation.

Drawings for Hunter Tower were researched in Conrail archives, the repository for PRR materials, and were not located. However, the New York and Long Branch Railroad plans and elevations for a "Proposed Signal Tower at South Amboy Junction" dating from 1940 illustrate a typical signal tower design which is similar in style and materials to Hunter Tower.

DEVELOPMENT OF INTERLOCKING SYSTEMS

Signal towers perform many functions for the railroad. Most towers contain interlocking machines which operate the track switches and signals that allow a train to pass safely over a potentially hazardous stretch of track. Depending on the local terrain, signal towers will also have flood detectors, rock-slide detectors, low air pressure detectors and equipment dragging detectors. Signaling techniques consist of lights and arms whose varied positions convey a particular message. Hands, kerosene lanterns, flags, vanes, targets, balls and moveable (semaphore) arms were used as signals in the early history of the railroad, and accidents, due to human error, bad weather or system failures were frequent. As rail traffic increased, tracks multiplied and the speed, weight and the length of the trains increased, it became apparent that a foolproof method for regulating rail traffic was necessary.

The first patents for interlocking machines were of English design and were granted in 1856 and 1867. The first interlocking in the United States was a Saxby and Farmer unit imported from England and installed by the United New Jersey Canal and Railroad Companies near Trenton in 1870. The first power interlocking controlled by compressed air was in East St. Louis by 1882. By 1884, the Railroad Gazette reported a total of 144 interlocking plants in service.

There are two primary types of interlocking systems--mechanical and electrical. In a mechanical interlocking, the operating equipment is physically connected to the tower with long rods. Inside the tower, the rods are manually operated by large levers called "armstrong" levers because of the strength required to move them. The armstrong levers control switches, signals and derails within the jurisdiction of the interlocking. Signals for an interlocking are configured so that a signal to proceed cannot be given until the track switches are in the right position and locked. This feature gives interlocking its name.

Mechanical interlockings require constant adjustment and high maintenance--most railroads have rebuilt them with electric controls. An electric interlocking uses electric motors to throw the track switches and derails. Instead of throwing armstrong levers, the operator throws electrical switches on a panel. With electrical interlockings, lights and computer displays of the plant keep the operator informed.

In 1901, the first electric interlocking plant was installed in Eau Claire, Wisconsin. A year later, the American Railroad Association reported that 18 electric plants were already in service. In 1925, Interstate Commerce Commission Statistics reported a total of 7023 interlocking plants in service: 930 were electric and 5,273 mechanically operated.

Today, modern central dispatching systems are quickly replacing the signal tower. Since the first coordinated system of Centralized Traffic Control (CTC) was installed on a 40 mile route at Berwick, Ohio in 1927, CTC has slowly replaced the functions of many signal towers across the country. Towers have been consolidated, removed and replaced with CTC and a CP (control point) consisting of a box along the right-of-way remotely controlled ("remotes") by a train dispatcher miles away.

The impending disappearance of the signal tower as a building type will undoubtedly mark the end of an era for the railroad. John Willever, a railroad enthusiast, best describes the interlocking tower in railroad historian Thomas Townsend Tabor's book *The Delaware, Lackawanna & Western Railroad in the Twentieth Century:* "What fond memories I have of that old tower. All of the levers, indicators, etc., were exactly as installed in 1901, and the semaphores were illuminated by oil, their red and white lanterns (always lit at night) giving off the pungent odors that oil lanterns emit, and the endless chatter of eight telegraph instruments clicking away while the dispatcher-type clock with its long pendulum cheerfully ticked away oblivious that it was marking the end of an era and a slower pace of life that will never come again."

The signal tower, fast becoming obsolete, has played an essential role in assuring safe passage of the railroad at terminals, yards, junctions, bridges, curves and crossings. In this role, signal towers have quietly and unobtrusively assisted in the growth and development of the railroad system across the nation. While not publicly accessible and almost always located in out-of-the-way locations, their presence on the railroad right-of-way has not gone unnoticed by the thousands of passengers who use the railroads. The replacement of signal towers with "remotes" has endangered this building type. Hunter Tower is but one of the many signal towers which are rapidly disappearing due to their obsolescence.

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Oral Interview, John Catrambone
Former Towerman for Erie Lackawanna Railroad, Superintendent of Train Operations under Conrail, Assistant Chief Train Dispatcher for NJ TRANSIT. Former General Chairman of Trains Dispatchers Union. Curator of Photography Show "I've Been Working on the Railroad".

The Collection of John Catrambone, Railroad Historian

Oral Interview, Timothy McMahon
The Collection of Timothy McMahon, Railroad Historian

Oral Interview, Vincent Insignalia, Block Operator, Hunter Tower

Photographs

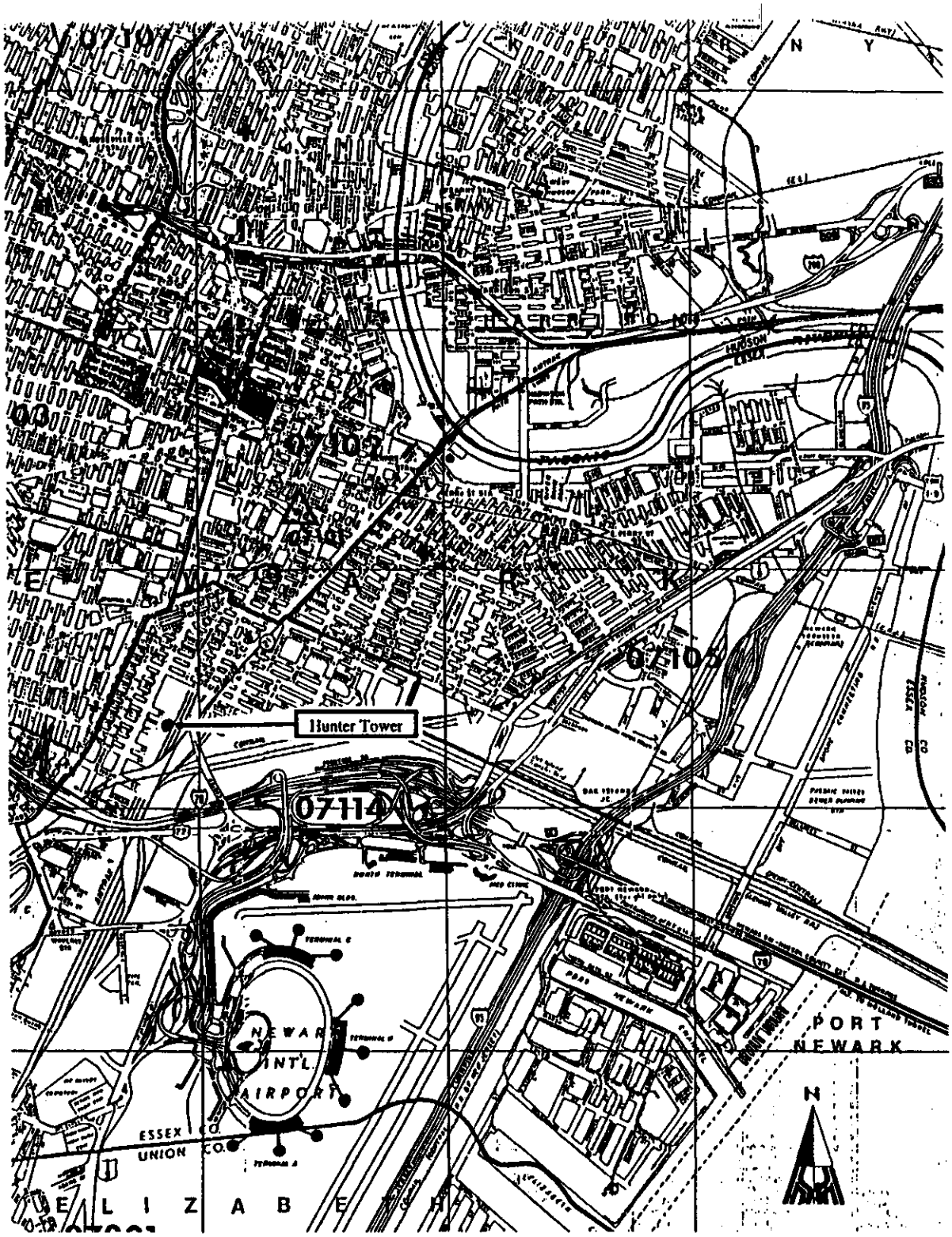
Boyd, James. "Two Hours at Hunter." *Railfan Magazine.* Volume I No. 11, August, 1977

The following sources were consulted but no additional historic photographs were found:

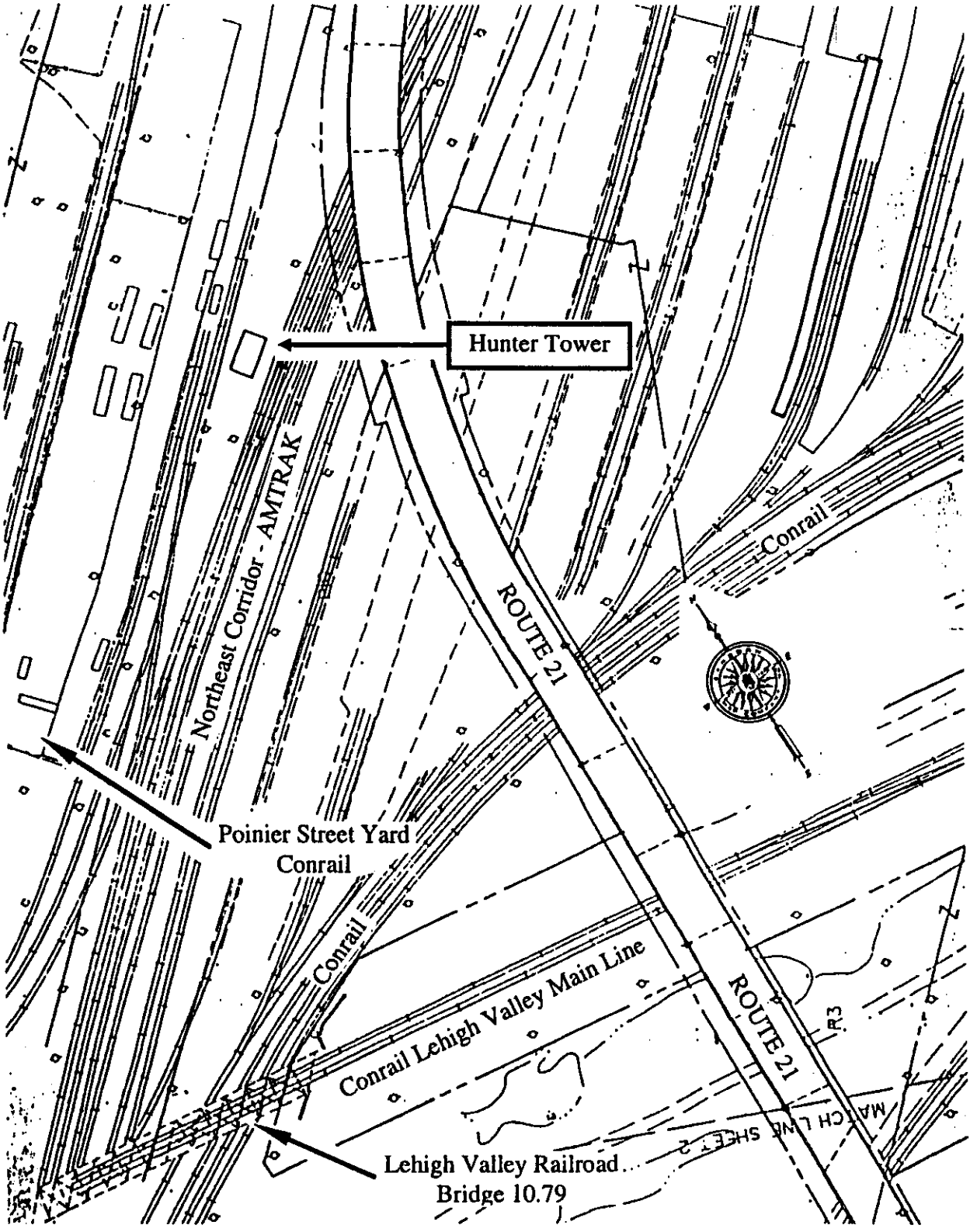
- Newark Public Library
- New York Public Library
- New Jersey Historical Society

In addition, both New Jersey Transit Microfilm Archives and Conrail Microfilm Archives were searched on several occassions but copies of original drawings for Hunter Tower were not located.

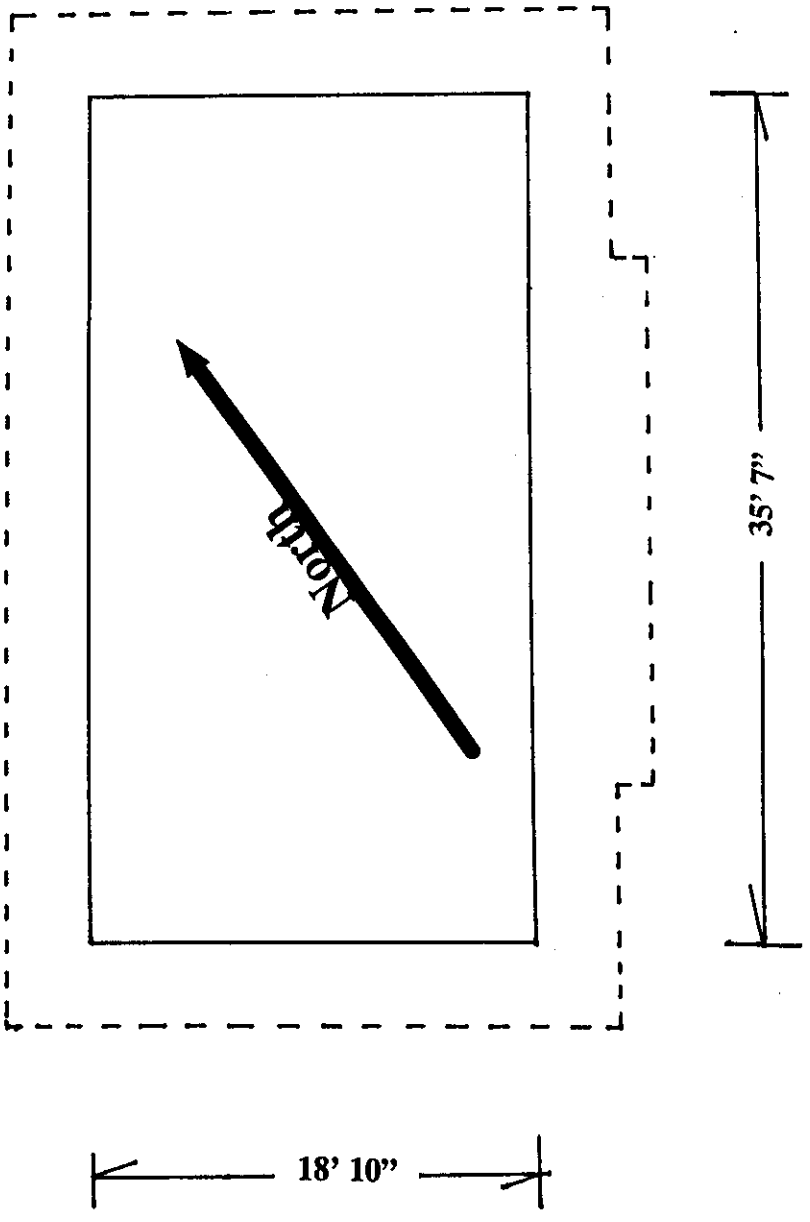
Location Map



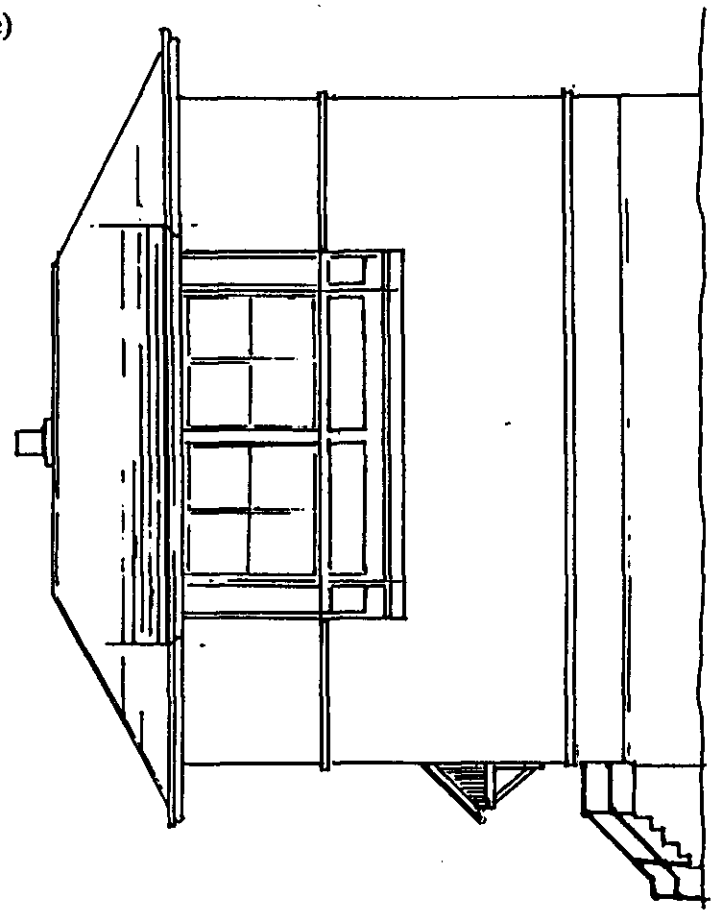
Site Plan


Hunter Tower
Northeast Corridor - AMTRAK
ROUTE 21
Conrail
Poinier Street Yard
Conrail
Conrail
Conrail Lehigh Valley Main Line
ROUTE 21
Lehigh Valley Railroad
Bridge 10.79

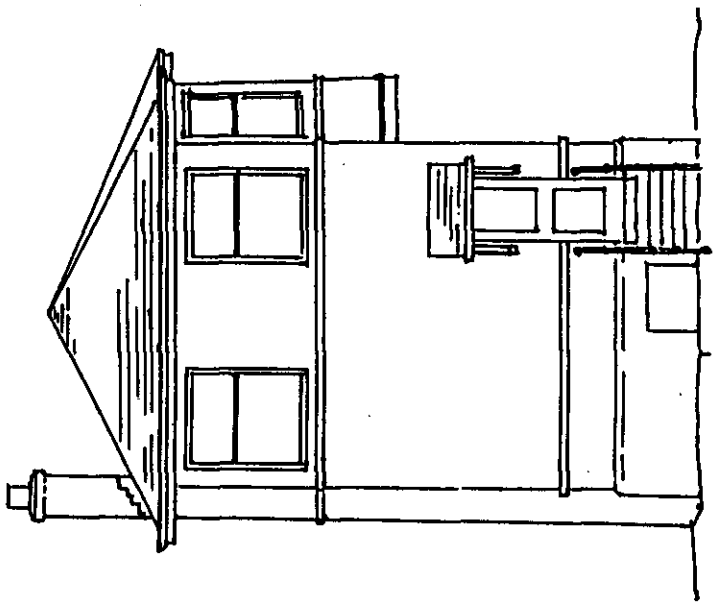
Sketch Plan
(not to scale)



Sketch Elevations: Southeast and Southwest
(not to scale)



Southeast Elevation



Southwest Elevation